सत्यमेव जयते

Government of India
Ministry of Urban Development

Report

of the committee for

Standards & Specifications of National Common Mobility Card (NCMC)

Committee for Recommendations on Standards & Specifications for National Common Mobility Card (NCMC)

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(Durga Shanker Mishra)
Additional Secretary
MoUD
Chairman

Pune
25th July, 2015

Acknowledgement

Ministry of Urban Development entrusted the task of developing standards and specifications for National Common Mobility Card (NCMC) which is inter-operable and vendor & operating system agnostic. I thank every member of the Committee who have very actively participated in the detailed deliberations on different aspects of developing these standards for the Common Mobility Card.

2. I would like to place on record my appreciation for Prof. Rajat Moona, Director General, Centre for Development of Advanced Computing (C-DAC) who provided support for the last meeting of the Committee on 25th July, 2015 and also gave technical inputs relating to various facets of the subject. I further thank Dr. AP Hota, Managing Director, National Payment Corporation of India (NPCI) and his team who have not only participated extensively in all discussions but also hosted the workshop to discuss various issues related to the subject with all possible stakeholders.

3. Further, I extend my sincere thanks to Department of Financial Services, Ministry of Finance, National Informatics Centre (NIC), Bureau of Indian Standards (BIS), State Bank of India (SBI), ICICI Bank, Master Card, VISA, EMBARQ, Delhi Metro Rail Corporation (DMRC), Bengaluru Metro Rail Corporation Ltd. (BMRCL), Kochi Metro Rail Corporation Ltd. (KMRCL) for their valuable ideas and suggestions and also sharing practical experiences on different aspects related to the Mobility Card. At the end, I would like to place my deep appreciation for Shri Mukund Kr. Sinha, Officer on Special Duty (Urban Transport) and Shri RK Singh, Director in the Ministry who are my colleagues and have contributed a great deal in developing this report.

4. I hope our efforts will pave way for development of Regional Mobility Cards with standards and specifications to be developed as recommended and these will ultimately get integrated in due course to realise the dream of NCMC.

Date : 25.07.2015
Place : Pune

(Durga Shanker Mishra)
Additional Secretary
Ministry of Urban Development

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1. Definitions

For the purpose of this report, the terms used, have the definitions as follows:

Account Based System (ABS): A payment system where the account balance is maintained at the servers and not on the card. A point of sale (POS) device interacting with the card linked to an account based system cannot know the account balance unless it connects to the server. For example, the debit cards issued by the banks are account based cards. In transit environment with account based systems, validation of the card is carried out using a zero value transaction at the POS and actual fare calculation is done at the backend.

Acquirer Bank: In an interoperable system, the bank that collects the payment from a cardholder through the payment card for a service provided by the merchant using an acquirer device.

Clearing House: A payment entity which connects and settles the "Off-Us" transactions of its members.

Closed Loop Payment Instruments (CLPI): Payment instruments generally issued by business establishments for use at their respective establishments only. These instruments normally used as proprietary solutions.

Combo Card: A card that has electronic chip as well as magnetic interface.

Dual Interface Payment Cards (DIPC): Cards having single chip but two interfaces- contact and contactless, both integral to the chip and allowing interaction through any of the interfaces.

EMV Standards: EMV stands for EuroPay, MasterCard and Visa. These standards define a set of standards for interoperability of integrated circuit cards (ICC) and Interface Devices (IFD). These are open specifications to facilitate global interoperability between ICC and IFDs.

Hybrid Card: A single card having two chips- one for contact and the other one for contactless interface.

Interoperable System: A system of payment wherein a card issued by any issuer bank can be accepted at any of the acquirer banks' devices.

IS 14202 & ISO/ IEC 7816: An international standard related to ICC. The contact based smart cards are wholly based on these standards in all parts while the contactless smart cards implement only higher parts of ISO/IEC 7816 standards which pertain to operating system and data element layouts.

ISO/ IEC 14443: An international standard for contactless integrated circuit cards.

ISO/ IEC 24014: An international standard that defines the architecture for Interoperable fare management system.

Issuer Bank: The bank that issues the card to the cardholder and undertakes the management of the stored monetary value or account.

"Off-Us" transaction: A transaction done on a device which does not belong to the card issuing Bank. In this case the acquirer bank is different from the issuer bank. Such transactions are cleared and settled by the payment network/ clearing house.

Open Loop Payment Instruments (OLPI): These are payment instruments which can be used for purchase of goods and services, including financial services like funds transfer at any card accepting merchant locations (POS), at acquirer devices and also permit cash withdrawal.

Stored Value Cards (SVC): These are cards with money/ monetary value stored on the card. A POS device can read the balance available on the card and debit it without needing to connect to the issuing system.

2. Acronyms

ABS	Account Based System
AEPS	Aadhaar Enabled Payment System
AFC	Automated/ Automatic Fare Collection
ATM	Automated Teller Machine
BMRCL	Bangalore Metro Rail Corporation Ltd.
BMTC	Bangalore Metropolitan Transport Corporation
CBS	Card Based System
C-DAC	Centre for Development of Advance Computing
CLPI	Closed Loop Payment Instruments
CTS	Cheque Truncation System
DIPC	Dual Interface Payment Cards
DMRC	Delhi Metro Rail Corporation
EMV	EuroPay MasterCard and Visa
FI	Financial Institution
IBA	Indian Bankers Association
ICC	Integrated Circuit Card
IFD	Interface Device
IFMS	Interoperable Fare Management System
IMPS	Immediate Payment Systems
KMRL	Kochi Metro Rail Limited
KYC	Know your customer
MoUD	Ministry of Urban Development
NACH	National Automated Clearing House
NCMC	National Common Mobility Card
NFC	Near Field Communication
NIC	National Informatics Centre
NPCI	National Payments Corporation of India
NUTP	National Urban Transport Policy
OLPI	Open Loop Payment Instruments
POS	Point of Sale device
PTO	Public Transport Operator
S&S	Standards and Specifications

SAM	Secure Application Module
SVC	Stored Value Cards
TSH	Transaction Settlement House
TSM	Trusted Service Manager
UTIITSL	UTI Infrastructure Technology and Services Limited

3. Background

Ministry of Urban Development (MoUD), Government of India, in accordance with NUTP-2006, envisaged the development of a cashless fare payment mechanism, which will work across all the public transport systems in the country such as metros, buses etc. leading to establishment of an Interoperable Fare Management System (IFMS). A payment instrument in the form of National Common Mobility Card (NCMC), based on such a system would provide seamless connectivity to passengers across all transit systems in the country bringing convenience and ease of payment for them. Moreover, the Interoperable system would lead to huge economies of scale for the public transport operators (PTOs) due to removal of duplicity of efforts as well as standardisation across issuance, acceptance, networking interfaces, clearing, settlement and dispute management systems.

For rolling out the NCMC, M/s. UTIITSL, a fully owned company of Ministry of Finance, Govt. of India, was engaged by the Ministry in April, 2010 as a technology aggregator. This company took initiatives for building a Transaction Settlement House (TSH) and entering into agreement with PTOs and other stakeholder agencies. The brand name, logo and design of the NCMC were launched on 6th December, 2011. UTIITSL prepared a document on "Minimum Standards & Specification for card and devices" which was circulated by the Ministry to all the States/ UTs and MDs of all the Metro Rail Corporations on 9th May, 2012. However, due to security issues and absence of inter-operability of the card, the work assigned to M/s. UTIITSL could not be carried forward and the engagement was withdrawn in November, 2014.

Subsequently a committee was constituted under the chairmanship of Shri Durga Shanker Mishra, Additional Secretary in the Ministry to develop an interoperable system which is vendor and operating system agnostic and to define card and device specifications & standards. This system would result in improving the convenience of public in hassle-free movement across various modes of public transport (e.g. Metros, rail, bus, taxi, auto, parking etc.) in a cost effective manner. This could also work in all locations across the country and may be used in retail outlets as well.

The committee had Director General, C-DAC; representative of DG, NIC; Joint Secretary, Urban Transport as its members. In the first meeting held on 23rd September, 2014 the committee deliberated on the concept and terms & reference of the mandate. In view of this, with the approval of the Chairman, representatives of NPCI, DMRC, BMRCL, KMRL, BIS and Department of Financial Services (Ministry of Finance) were also co-opted to ensure wider deliberations.

In the second meeting of the committee held on 24th November, 2014, other stakeholders including banks were also invited for consultation and deliberations in taking forward the process of finalising the national S&S for NCMC. The following action points emerged in the meeting (minutes of the meeting at **Annex-A**):

- DG, C-DAC will prepare a work flow diagram on further course of action particularly for transaction, transaction security and speedy transaction system;
- NPCI will organise one day workshop with all the stakeholders;
- NPCI and DG, C-DAC will hold consultations with major stakeholders before the proposed workshop and come up with draft specifications; and
- All stakeholders will go through the specifications in the workshop and provide their feedback.

The committee also made the following key observations:

- The standards should allow for easy integration and adoption by all stakeholders;
- The NCMC should be at least as secure as Debit / Credit Card;
- There should be facility for offline recharge (top up) to the card with intimation to the cardholder;
- While the use of NCMC should be encouraged, option for token/ ticket should also be available;
- The standards should provide support for stored value, pass and single ticket transit transactions; and

- A national clearing and settlement system should be used for interoperable transport application.

The committee noted that NPCI is a not-for-profit payment system entity, conceived by Reserve Bank of India and founded by IBA as an umbrella institution for retail payment systems. This is a company set up under section 25 of Indian Companies Act, 1956 (now, section 8 of the Indian Companies Act, 2013). NPCI is already operating several retail payment systems such as IMPS, CTS, NACH, AEPS, RuPay etc. since 2010 and is already engaged in the EMV based card payment system. It provides the National Financial Switch which connects around 500 member banks for providing ATM services across different acquirers and issuers. NPCI has also brought out its own payment card under the brand name RuPay which is an integral part of Pradhan Mantri Jan Dhan Yojana (PMJDY).

4. The NCMC Workshop

The NCMC workshop was held on 20th December, 2014 with participation of several stakeholders. The proceedings of the workshop are attached with this report as **Annex-B.** During the workshop three groups were formed for detailed domain specific discussions on NCMC. These groups were formed to address the following issues related to NCMC:

- Business and functional requirements;
- Technology Solution Requirement; and
- Operating Guidelines and Legal Requirements.

In order to cover all aspects of NCMC in a comprehensive manner, the participants deliberated extensively and made their recommendations. The broad recommendations emerged as following:

- NCMC should provide interoperability, scalability and security in terms of acquisition, recharge, clearing, settlement and dispute management;
- It should be open in the sense of supporting multiple issuers, acquirers, vendors and form factors (such as cards, mobiles etc.);
- It should dovetail transit with payment system technologies such as prepaid (Store Value Cards), debit and credit cards;
- The solution should support multiple options of recharge viz. cash, online banking, debit/ credit card etc;
- It should support two way authentication between ICC and IFD i.e. payment instrument and terminal should authenticate each other before authorizing the transaction;
- It should support contactless communication, based on ISO/ IEC 14443 standards;
- Other communication interfaces, like contact interfaces based on IS 14202 and ISO/ IEC 7816, may also be permitted for use in different contexts;
- It should support on-card stored value, non-personalised passes, loyalty points and tickets;

- It should allow issuance at multiple locations including transport operator locations;
- It should not mandate the cardholders to have bank account;
- It should allow writing of entry and exit log records on ICC by authorized IFDs;
- It should be vendor and form factor agnostic and support multiple Operating Systems;
- It should have a robust testing and certification process to ensure adherence to standards;
- It should have comprehensive and user friendly dispute management system;
- It should have capability to handle retail payments for non-transit applications;
- C-DAC should be entrusted with the task of designing the metro gates/ validators for AFC indigenously to align with "Make in India" initiatives of the government and minimize the dependency on international players; and
- Standards should be developed indigenously, leveraging on international open standards and under the direct control and authority of an Indian entity.

5. Possible Models for NCMC

There had been several worldwide initiatives relevant to transit such as the Oyster Card (London in 2003), Octopus Card (Hong Kong in 2005), CEPAS standards cards (Singapore in 2006), ITSO (UK), AFIMB (France), VDV-KA (Germany) etc. These initiatives, however, provided no or limited interoperability between various modes of transit across different PTOs. Newer initiatives such as TfL in London, various cities in USA (Utah, New York, New Jersey etc.) provide better services, ease of operations and interoperability among several modes of transit. Globally, there is no nationwide common transit card except one in Singapore. Further, even interoperability is usually confined within the city and its suburbs only.

Following are the three models studied by the committee, which are relevant for NCMC standards adoption in India:

Model 1: Closed Loop Solution: These are solutions where cards are issued to a cardholder for a specific purpose by a single entity. The cards are then used at locations which are defined by the issuing entity. Such solutions do not permit cash withdrawal, redemption, payment and settlement for the third party services. If these are to be adopted for the NCMC, the purpose will be limited to transit only usage only.

Open Loop Solution: These are solutions where cards are issued to cardholders by multiple issuing entities and are accepted at multiple locations not necessarily belonging to a specific entity only. The solution provides interoperability amongst the members who subscribe to the solution and becomes a part of the payment network. EMV is a widely accepted global standard used by the banking industry worldwide and provides adequate security to payment transactions. EMV based open loop solutions enable the program operator to make the card acceptance not just at the terminals of transport operator but also at innumerable retail terminals within the country. The EMV based open loop solution can be implemented in 2 models discussed below:

Model 2: EMV Open Loop Account based model: The EMV cards that are linked to an account (i.e. debit or credit cards) can be used for the purpose of payment in transit applications. In this model, payments cards use contactless EMV standard applications in which the card is

authenticated using a zero value offline transaction. The fare calculation and debit to card holder account is carried out at the backend servers only after these offline transactions are processed by AFC system and sent to the banks. Usually these transactions are sent to the bank in batches for debiting the customer account and carrying out clearing and settlement.

Model 3: EMV Open Loop Card with stored value: In this system, the EMV based open loop solution for the payment is built with pre-stored value on the card. The transaction authorization and debit to the stored value is carried out locally offline on the card. In the case of NCMC adoption, apart from the transit application, such cards will be capable of handling retail payment applications as well as other services like parking, loyalty etc.

A detailed description of three models vis-à-vis their interoperability is given in the following discussion:

5.1 Model 1: Closed Loop Solution

Historically, this model was used by a transport authority to cater to the transport card requirements of a specific city or state and for a specific mode of transport. This model is most effective when a single entity controls and regulates the entire transit ecosystem and there is no need for extensive business level agreements, key management or account settlement between multiple transport authorities, banks and other payment entities. The most notable examples of such a scenario are the Octopus cards in Hong Kong and the CePAS specifications in Singapore. The card issuance and transit ecosystem in these scenarios are tightly controlled by a single authority. Such cards issued are not general purpose cards like the one issued by banks and are exclusively for transit or low value payments in partner retail outlets where the acceptance have been specifically built for those cards. Cards based on such standards are not generally adherent to and compliant with the existing banking standards and thus cannot utilise the existing infrastructure set up by the banks over the years for retail payments. Further, such systems can be interoperable across various transport agencies when the systems are based on common standards and there exists a central clearing and settlement agency which provide security and trust of payment transaction settlement through a robust and distributed key management system.

Closed loop systems require Public Transport Organizations (PTOs) to also manage payment systems in addition to managing AFCs and providing

cardholder services. In short, the PTOs would need to build expertise beyond their core activities of managing transit. Further a central transit clearing house would need to be established by an independent entity exclusively to manage clearing and settlement.

5.2 Open Loop Solution:

5.2 (a) Model 2: EMV Open Loop Account based model:

Various International Payment Schemes globally are trying to promote the usage of EMV based generic banking payment cards for transit purpose. The use of bank issued cards at Transport for London (TfL) controlled metros and buses in London and in certain cities in US are examples of this model. Because of the widespread usage and reliability of EMV standards, a transit ecosystem piggybacking on bank issued EMV based payment cards can be interoperable. In such a scenario, the transit operators fit into the existing payment ecosystem as any other merchant and need not to worry about handling card issuance and its peripheral activities.

These specifications can ensure complete interoperability across at all AFC systems and by default at retail and non-transit locations where it is already in use.

Such EMV based cards, which are to be used in transit area, usually have dual interface – contactless interface for transit application, and contact interface to cater to the existing POS infrastructure at general merchants and other establishments.

Although the model has its distinct advantages, there are certain constraints for adoption as NCMC standards given as below:

- As these cards do not provide the general characteristics of a typical transit card containing data elements such as pass products eg. Weekly, monthly, student, differently abled etc., no fare calculation or money transactions can happen when these cards are presented on the readers of AFC systems. As explained earlier the fare is instead debited from card holder account in the back end card host system. This limits the use of these cards for pass systems, limited journeys etc.
- This model limits checking process for ticketless travel, collection of excess fare, fine etc., from card holders by the

transit authorities as the ticket inspectors would not be able to validate the ticket on the card offline because all transactions are taking place in the backend.

- As the journey is allowed based on only validating a card at the entry gate and not on fare calculation/ money deduction basis, there is a need for having robust backend systems for fare calculations and then deduction of money from the account of the commuter. This results in increasing the cost of backend systems both from Capex and Opex perspectives to ensure prompt validation of the account especially from transit perspective.

- Further, there is always a risk of insufficient balance in the cardholder account at the time of debiting the account.

5.2(b) Model 3: EMV Open Loop Card with stored value:

This model combines the benefits of an EMV card with the capability of a stored value card to support transit, banking and other payment/ non-payment applications. The specifications supporting this model have the advantages of both the above explained models.

This model offers following additional advantages over an account based EMV model:

- The entire transaction of secure identification, fare collection and debit of the money is carried out offline and is recorded in the card memory. This renders offline checking by transit authorities like the ticket checking Inspectors;

- This model can provide both account based and stored value based services. Thus the card can simultaneously provide transit as stored value service, even across different PTOs, through a contactless interface and other general purpose account-linked service on the contact/ contactless interface for retail applications. This aspect provides convenience to the commuters by eliminating the need to carry separate cards for banking and transit requirements, thus making it a real Smart Mobility Payment Card.

Note: Beyond a certain limit of recharging the card, the card is required to be KYC compliant in all the three models as per RBI guidelines (**Annex-C**). Detailed comparative analysis of the three models is given at **Annex-D.**

6. Conclusion

During the third meeting of NCMC held on 29th April 2015, Committee deliberated on pros and cons for the three models for adoption as NCMC standard. Committee after detailed deliberations chose to recommend only the **EMV based open loop card with stored value specification**, i.e. **model 3** as explained in **chapter 5** of this report, to be adopted as NCMC standards. Committee looked at various international standards which are relevant in this context including ISO/IEC 24014 which is relevant for **Model 1**, i.e. closed loop **Transit specific NCMC standards**.

Committee noted the model adopted by KMRL as explained in **Annex-E.** The use of the EMV based contactless stored-value card in KMRL was noted as an example of success in terms of interest and bidding by the financial institutions and hence committee felt that the **Model 3**, i.e. **EMV based open loop card with stored value,** supports the right business models along with the right technology option. These cards can also work across the countrywide EMV enabled retail payment network.

Further as RBI has already enabled single factor authentication mechanisms for small payments by issuing guidelines, the required regulatory framework is also in place. Thus these cards will be highly usable for small payments of AFC as well as for the retail payments from the stored-value perspective. Further for those users who can link their cards to their bank accounts, these will provide additional advantage of automatic recharge if so opted for by the cardholder.

Based on the detailed deliberations on pros and cons of the deployment, the committee concluded that the following minimum infrastructure must be developed for a true inter-operable system of NCMC:

- Development and publishing of Standards and subsequent certification and testing for the following:
  - Cards ;
  - Terminals
  - Metro gates/ validators;
  - SAM Interface (if applicable);

- Network message interface for all stakeholders involved i.e. acquirer, issuer, AFC provider etc.;
- Common Personalization specification for card personalization;
- Clearing and settlement standards;
- Trusted Service Manager (For Mobile based NFC solutions); and
- Key management (Symmetric/ Asymmetric);
- Software security.

For metro gates/ validators, the standards and hardware may be developed by CDAC with the financial assistance provided by MoUD as these are presently proprietary items of only a few overseas companies who supply these in Indian market. This will also bring down the overall cost of the hardware when developed indigenously. Rest of the standards may be provided by NPCI. This may be in line with Government's 'Make in India' initiative.

- Develop and manage the ecosystem for
  - Clearing and settlement covering
    - Operating guidelines;
    - Dispute management guidelines;
  - Key management;
  - Simulating cards, terminals and network; and
  - A support base of vendors for providing certified tools, cards, terminals and other services.

In tune with "**Make in India**" initiative of the Government, Committee felt that these components including those for clearing, settlement and dispute management could be developed indigenously by NPCI. This approach would also facilitate the following:

- Avoid outflow of the wealth, by providing clearing, settlement and dispute management infrastructure by an indigenous payment network;
- Build the knowhow in defining, operationalising and modifying the standards to suit the local requirements and to maintain the standards on a long term basis; and
- Quick response to market with secure, inter-operable and scalable system through a robust certification and testing mechanism.

7. Recommendations

The Committee recommends:

- Develop and publish NCMC standards & specifications around the **EMV open loop card with stored value**, i.e. **Model 3** as has been explained in **section 5.2(b)** of this report;
- Engage an indigenous domestic payment card network for developing specifications AFC system, Cards, Readers, Payment Networks, Software Security and any other device/ entity which may become part of the eco system like mobile phones etc. and payment protocols;
- Create certification mechanism for AFC system, Cards, Readers, Payment Networks, Software Security and any other device/ entity which may become part of the eco system like mobile phones etc.;
- Explore use of KMRL model as a business model for PTOs (KMRL business model has been explained in **Annex-D**);
- Initiate the work on designing the metro gates/ validators by C-DAC indigenously to minimize the dependency on international players;
- Dedicate the standards and specifications to the Nation;
- Align the system with other Government initiatives such as Make in India, Design in India, Pradhanmantri Jan Dhan Yojna and Aadhaar based eKYC;
- Enable '**Off-Us**' transactions in the transit echo system. The fee/ charges applicable in such a case of '**Off-Us**' transactions in transit should be determined by PTO in consultation with the Card scheme and FIs in compliance with RBI guidelines, if any, and adequate measures should be put in place to ensure no undue burden is put on to the commuters; and
- Initiate regional implementation at first, with local transit operators within the region like BMTC, BMRCL, KMRL etc. In due course, these will get integrated at national level to ensure single common card (i.e. NCMC) acceptance across all PTOs, other transit modes, retail networks and e-commerce.

Annex-A

Minutes of the Second Meeting of the Committee

No. K.14011/24/2012-UT-I
Government of India
Ministry of Urban Development
Urban Transport –I Desk

Nirman Bhawan, New Delhi
1st December, 2014

OFFICE MEMORANDUM

Sub: Minutes of the 2nd meeting of the Committee held on 24.11.2014 to finalize the Standards/ architecture/ software architecture of the National Common Mobility Card (MORE) - regarding.

The undersigned is directed to forward herewith Minutes of the 2nd meeting of the Committee held on 24.11.2014 at 3.00 PM under the chairmanship of Additional Secretary Ministry of Urban Development to finalize the Standards/ architecture/ software architecture of the National Common Mobility Card (MORE) for further necessary action.
Encl: As above.

Sd/-
(R.K. Singh)
Director (UT-I)
Tel: 23062798

To

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10. The Managing Director, Delhi Integrated Multi-Modal Transit System Ltd. (DIMTS), 1st Floor, Maharana Pratap ISBT Building, Kashmere Gate, Delhi-110006.
11. Shri Jayjit Dey, General Manager, Ho-Ho Bus, Purple UMTC Transit Pvt. Ltd., Room No.608, 6th Floor, New Delhi House, Barakhamba Road, New Delhi. E-mail: jayajit@hohodelhi.com, Fax No.011-45586348, Mob: 8800795474.

Copy to:

1. *PPS to Addl. Secretary, MoUD.*
2. *PPS to JS (UT).*
3. *PS to Dir (UT-I).*

Minutes of the 2nd Meeting of the Committee held on 24.11.2014 under the chairmanship of Additional Secretary (UD) to finalise the Standards/ architecture/ software architecture of National Common Mobility Card- "More"

List of the participants is at **Annexure-I**.

2. At the outset, Additional Secretary (AS) welcomed all the participants and briefed about the action taken so far by the Ministry for implementation of National Common Mobility Card. He informed that the Committee has been assigned the work to finalise the Standards/ architecture/ software architecture of National Common Mobility Card- "More": In this regard, during the 1st meeting, DG, C-DAC was requested to come out with the draft concept note on the Card for circulation among all the concerned members for their views/ comments.

3. DG, C-DAC informed that he has prepared the draft Concept Note and sent to Ministry today itself. Since the Concept Note received today only, it could not be shared with other members for their comments/ suggestions. Hence, AS requested all the participants to go through the draft concept Note and submit their comments/ views to DG, C-DAC under intimation to the Ministry to incorporate all these suggestions. A copy of the draft concept note is attached as **Annexure-II**.

4. He, further, stated that to achieve interoperability and seamless travel on the national scale the Interoperable Fare management System (IFMS) is required to be governed by certain rules and standards. The main components of the IFMS will be: common mobility card, transaction settlement house (clearing and forwarding) and service to provide automated fare management system. The common mobility card may use SCOSTA CL Operating system which provides a mechanism for the exchange of information between the smart card and reader and interpretation of commands and data. It facilitates security using symmetric cryptography using DES and Triple-DES(3 DES). Transaction Settlement House (TSH) is the most essential component of the IFMS which will act as collection and forwarding entity. Since the Card is to be used in various services like for fare in all kinds of public transport, toll, parking etc., there will be several service providers (PTOs) interacting with their designated CTSH based on their geographical proximity.

5. He suggested that at this stage while we are defining the standards, everyone i.e. all the stakeholders should be on board so that the card is more compact and can be used by everyone.

6. All the participants were unanimous on the issue that the proposed card should be compatible, credible, suitable and scalable. AS added that the security level should be same as in the case of Debit/ Credit card. Representatives from SBI suggested that there is one option that there should be some mechanism for making payment from Debit Card itself.

7. Representative from DMRC stated that before finalizing the mechanism, we should keep in mind following 4 points to make it more attractive:

(i) decide whether the card will be used offline/online unlike debit card;
(ii) transaction speed should be very fast;
(iii) DMRC has the experience that 30-40% persons travel a single journey and the fare of single journey will be much lesser to purchase a card. Such passengers will not be interested in purchasing a card. Hence, there should be some provision for selling of token/ ticket for such clients/ travellers etc.;
(iv) Transaction clearing house facility.

8. NPCI representative informed the Committee that since its incorporation in 2008, NPCI is working as an umbrella institution for all the "Retail Payment Systems" in the country. It has been incorporated as a Section 25 company under Companies Act and is aimed to operate for the benefit of all the member banks and their customers. Some of the activities being undertaken by them are: all ATMs have been connected for end to end settlement on behalf of RBI, ECS is being done by them, all banks have been connected to NPCI, UIDAI is also taking assistance from them. NPCI has initiated process for contactless transaction. For this, specifications are being prepared and it is at very advanced stage.

9. NPCI representative also stated that they are ready to offer their services for preparing specification for the national common mobility card. They will also take care the security feature of the card.

10. After detailed discussion, following action points emerged:

(i) DG, C-DAC will prepare a work flow diagram on further course of action particularly for transaction, transaction security and speedy transaction system.
(ii) All the stakeholders including Banks, NIC, state transport undertakings, metros will go through the specifications being prepared by the NPCI and provide feedback to NPCI
(iii) NPCI and DG, C-DAC will hold consultations with major stakeholders in meetings before the proposed workshop.

(iv) NPCI will organise a one day Workshop with all the stakeholders preferably on 20th December, 2014 in Mumbai to discuss and finalise all aspects related to MORE and its specifications and standards. All major Banks also could be interacted for participating in this National Mobility Card initiative. Metros, few Urban Bus Service Charters and few big parking operators (may be from Mumbai) and RBI be invited in the Workshop for wide consultation. DG, C-DAC and NIC will assist in organizing this consultation through Workshop.

11. It was also decided that since DMRC has already taken several initiatives towards integration of their cards with Rapid Metro, DTC etc., they should go ahead with their project and once the National Transaction Clearing House (NTCH) comes into effect, their TCH should be integrated with the NTCH in a phased manner.

12. Summing up the meeting, AS reiterated that we have to develop a system based on ISO standard technology and not focus of product so that whosoever desires to be integrated with this system can easily be placed on board. The security feature should be similar to the Debit Card/ Credit Card and it should be compatible and scalable. There should be facility of offline credit to the card with intimation to users. It should be readable to all at all places and it should be left to all transport operators to subscribe the system as per their standard. However, ticketing system should also be continued to cater to the requirement of casual/ infrequent travellers. He once again requested all to assist NPCI/C-DAC/NIC in writing the standard & specifications of the card and finalise it at the earliest.

13. There being no other item, the meeting ended with thanks to the chair as well as participants.

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ANNEXURE I

List of Participant of 2nd Meeting of the Committee held on 24th November, 2014 at 3.00 PM under the Chairmanship of Additional Secretary (UD) to finalize the Standards/ architecture/ software architecture of the National Common Mobility Card (More) - regarding.

S.No.	Name & Designation, Organization
1.	Shri D.S. Mishra, Additional Secretary, MoUD - Chairman
2.	Shri R.K. Singh, Director (UT-I)
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16.	Shri Ashish Kar, AUP, NPCI E-mail: ashish-kar@npci.org.in
17.	Shri Pankaj Kumar, Under Secretary (UT-I)

Annexure-II

Concept note on Common Mobility Card (MORE)

1. BACKGROUND:

The National Urban Transport Policy under the Ministry of Urban Development (MoUD) envisages a single fare media over all systems of public transport for Interoperable Fare Management System. This single fare media will bring in seamless travel connectivity across different modes of transport and different operations across different cities in India. This will promote the user to perceive a single system across the country. The main features of the proposed system are

- Interoperable Common mobility card across modes of transport and cities
- Convenience and seamless experience for commuter
- Economies of scale to bring down costs compared to solo efforts of Public Transport organizations (PTOs).

The IFMS supports for fare payment on Buses, Metro, Monorail, Ferry, etc. for various Public Transport Organizations (PTO) across the country. In future the IFMS is designed and will be rolled out to be accepted in;

a) All kinds of Public Transport like railways, light rail, taxi, auto, etc.
b) Para transit services like Toll, Parking,
c) Other merchant payment like utility bills, taxes, etc.

2. SMARTCARD TECHNOLOGY

The smartcard is the technological successor to the magnetic stripe card. Smartcards are typically the size of a credit card, and contain a

microchip that stores and transmits data using radio frequency enabling it to communicate with a device within ten centimetres of the card without physical contact. Smartcards are able to store enough information to process monetary transactions and profile a card holder's details for security purposes.

Smartcard ticketing is well established as the standard best practice in public transport ticketing, and its emergence is indicative of a broader transition towards a cashless global economy.

There are two categories of smartcards that can be used for public transport ticketing – a single purpose transit pass and an electronic purse (e-purse) card with multiple applications beyond fare payment, such as small retail transactions and personal identification. Both involve a prepaid account managed by the card holder.

Recent innovations in smartcard technology have concentrated on developing e-purse applications to enhance the appeal and accessibility of smartcard ticketing to infrequent commuters or tourists.

3. ADVANTAGES OF SMARTCARD TICKETING

3.1. Convenience for commuters

Smartcard ticketing systems enable commuters to carry one durable card for use on all transit modes. A single multipurpose ticket makes using multiple transport modes much simpler and less time consuming. In turn, this facilitates the multimodal travel behaviour that is encouraged by operators and transport planners. In this regard, smartcard ticketing facilitates a genuinely seamless multimodal transport system.

Options to automatically top up a prepaid account via direct debit or credit payment – similar to e-tolling systems for toll roads – allow commuters to pay fares without ever having to make face-to-face

transactions. This reduces the time spent commuting as card holders are able to top up their account balance at a time that is most convenient to them. Consequently, the possibility of missing a public transport service whilst queuing for a ticket is eliminated.

'Pay as you go' (PAYG) features also ensure that commuters get exactly what they pay for, as the card is swiped at the start and end of every journey. Typically, commuters are guaranteed the lowest possible fares when using a smartcard, which provides a considerable financial incentive for commuters to take up smartcards and to use them properly.

With less need to carry cash, commuters using smartcards can also enjoy greater personal security. In the event of a card being lost or stolen, accounts can be cancelled and a new card issued, as would be the case with a bank card or credit card. By the same measure, cashless transactions benefit transport agencies, as the security risk to drivers and other cash handling employees is significantly reduced.

3.2. Increased service efficiency

A typical smartcard transaction takes just 150 milliseconds to complete, and with drivers and other public transport employees no longer required to collect money and issue tickets, smartcard ticketing systems deliver significant savings in boarding times.

The reduced boarding times for commuters frees up capacity for operators to increase service frequency, enhancing the utility of transport assets – both rolling stock and road and rail infrastructure. Service providers also stand to save considerably on operating costs associated with fare collection and issuing tickets.

3.3. Travel data collection

Traditionally, the data used to inform transport policy and the planning of service provision has been gathered from sources such as annual travel surveys.

Smartcard technology is capable of storing and transmitting much more information than the magnetic stripe card, opening up new possibilities for transport agencies to collect precise data on the travel patterns of individuals. This enables better planning for the entire network. Even a small percentage of smartcard use can yield superior data for transport operators than the limited sample and scope of the traditional data sources

3.4. Demand Management

Government predominantly aim to promote public transport patronage by investing in the supply of new infrastructure and rolling stock. Implementing smartcard ticketing, on the other hand, presents an opportunity for government to significantly influence the demand for public transport. With access to comprehensive travel data on the demand side, transport operators are able to develop and improve ticketing as a consumer product. This may include offering discounts on travel to and from certain areas at various times to stimulate the spread of demand across a network, maximising its revenue earning potential and encouraging increased patronage in off peak periods.

Individuals can also be offered discounts as an incentive for frequent travel, encouraging more people to use public transport and rewarding sustainable transport choices

4. PARTICIPANTS OF COMMON MOBILITY CARD

Participants in common mobility card system can take one or more following roles,

4.1. CARD ISSUER

The card issuer will be responsible for issuing the Common Mobility Card. The card issuer will hold the funds paid by the card holders to reload agents until card holder actually conduct a transaction. The card holder will transfer the fund to the service provider when supplied with the transactions substantiating with the value of good/services through Transaction Settlement House

4.2. RELOAD AGENT

Reload agent will collect funds from the card holder and load value into their Common Mobility Card. The funds are remitted to the card issuer who will pay the reload agent a fee for the service.

4.3. SERVICE PROVIDER

The service provider will deduct funds from the Common Mobility Card in exchange of services and goods. The details of these transactions is send to the Transaction Settlement House and receives funds from the Card Issuer as a result of TSH daily clearing and settlement process. The most common service provider can be Public Transport Operator (PTO) provide transport facilities to card holder.

5. COMPONENTS OF IFMS

To achieve interoperability and seamless travel on the national scale IFMS has to be governed by certain rules and standards. The main components of the Interoperable Fare Management Model is

a) Common Mobility Card
b) Transaction Settlement House [Clearing and Forwarding]
c) Service Provider Automated Fare Management System

5.1. COMMON MOBILITY CARD

The common mobility card is a definition of contactless smart card data layout and access rules. The common mobility card will use SCOSTA CL Operating system. The SCOSTA CL provides a mechanism for the exchange of information between the smart card and reader and interpretation of commands and data. It facilitates security using symmetric cryptography using DES and Triple-DES (3DES).

5.2. TRANSACTION SETTLEMENT HOUSE

Transaction Settlement House (TSH) is the heart of the Interoperable Fare Management System (IFMS) which acts as collection and forwarding entity. The system comprises of 1 to n numbers of Regional / City Transaction Settlement House (CTSH). There are several service providers (PTOs) interacting with their designated CTSH based on their geographical proximity.

TSH is designed to cater for ever growing transaction volume needs of the participating service providers (PTO). TSH comprises of two tiers viz. National Transaction Settlement House (NTSH) and Region / City Transaction Settlement House (CTSH) to cater for intercity and city specific transactions respectively.

The CTSH component of the TSH will manage interoperability and settlement among a group of service provider's AFCS within the same city or nearby cities / regions. The NTSH component of TSH will manage all the interoperability and settlement between CTSHs, apart from other management related to registration, authentication, security etc.

The TSH provides centralised management of the Application and Products registration, security infrastructure and policies supporting the

IFMS including management, distribution and hot listing of Keys and Security Access Modules (SAM's) etc.

5.3. SERVICE PROVIDER AUTOMATED FARE MANAGEMENT SYSTEM:

Each of the operators will have their own automated fare collection and electronic ticketing system purchased from different suppliers, but they all have to adhere to a common specification ensuring interoperability between the fare management systems.

5.3.1. OPERATORS AND FUNCTIONS

Operators with their respective functions are described below

5.3.1.1. Product Owners

The service providers will function as product Owners with their own suite of Products which will be used except the Products that are to be interoperable Products. One of the functions of the Product Owner is collection and forwarding for settlement in case of use of Interoperable products and other issuing customer fare media.

The IFMS in tandem will support the following:-

(a) Interoperable Products - A common e-purse fare payment in accordance with the fare rules of each service providers and defined in the IFM model. This product is owned by the owner of National Common Mobility Card Application.

(b) Service Provider Products – The IFM support different types of Products based on service provider requirements like season tickets and passes for different categories of passengers including general passengers, students, senior citizens, etc.

(c) Loyalty/Discount Schemes - Ability of the TSH to support application of bonus, discounts and loyalty schemes – The System shall support the application of specific bonus (e.g. free travel), discounts (reduction in the fare rate) and loyalty schemes (recording of usage rates which can trigger the application of bonus, discount or other entitlements).

(d) Products of Para-transit services – The IFM model designed to enable payment and settlement for para-transit and non-transit services (e.g. parking, taxis, auto-rickshaws, toll, etc.) using interoperable products such as e-purse.

5.3.1.2. Application Retailers

All service providers / operators (PTOs), merchants, banks and Point of Sale (POS) will function as Application Retailers, i.e. they will initialise the Customer Medium for further issuing of Products of various service providers on the Customer Medium.

5.3.1.3. Product Retailers

All service providers / operators (PTOs) will function as Product Retailers for interoperable Products in addition to their own Products. This implies storing Product data on the Customer Medium and changing these data, e.g. storing electronics values on the customer Medium or updating a period passes etc.

Annex-B

Proceedings of NCMC Workshop

No. K.14011/24/2012-UT-I
Government of India
Ministry of Urban Development
Urban Transport –I Desk

Nirman Bhawan, New Delhi
5th January, 2015

OFFICE MEMORANDUM

Sub: Minutes of the workshop on Standardization on specification for National Common Mobility Card (NCMC) held on 20th December, 2014 at NPCI, Mumbai - regarding.

The undersigned is directed to forward herewith Minutes of the workshop on Standardization on specification for National Common Mobility Card (NCMC) held on 20th December, 2014 at NPCI, Mumbai for further necessary action.

Encl: As above.

Sd/-

(R.K. Singh)
Director (UT-I)
Tel: 23062798

To

As per the list.

Copy to:

1. *PPS to Addl. Secretary, MoUD.*
2. *PPS to JS (UT).*
3. *PS to Dir (UT-I).*

Minutes of the workshop on Standardization of specification for National Common Mobility Card (NCMC), held on Dec 20th, 2014 at NPCI, Mumbai

Participants: As per list attached.

Shri A P Hota, MD & CEO (NPCI), welcomed Shri D S Mishra, Additional Secretary Ministry of Urban Development (MoUD), Shri R K Singh Director MoUD along with other participants from C-DAC, NIC, Banks, Metro Corporations, consultants, solution providers, Transport operators. Participants were highlighted about MoUD's initiative w.r.t. implementation of National Common Mobility Card (NCMC)

2. Shri D S Mishra Additional Secretary (UD), informed that Govt. of India's emphasis on Urban Mobility & other urban transport related projects as per National Urban Transport Policy (NUTP-2006) issued by Govt. of India. He highlighted various projects such as BRTS, Trams, Golden Quadrilateral Roads, Metro Rail projects etc. being implemented in the country. He indicated that the proposed mechanism of NCMC was already established years back & running smoothly in foreign countries viz Singapore, so it is high time that India should have similar system in place at the earliest. The proposed system should cover all modes of Transport, Toll collection, Parking Charge Collection etc., in nut shell; all sort of Payment collection for any form of service should be doable. He informed that MORE card launched in 2011, via UTI Infrastructure Technology And Services Limited (UTIITSL), a government owned company that provides technology and outsourcing services to the financial and government sectors of India, had to be stopped and subsequently withdrawn & scraped for lack of interoperability and its vendor dependency issues. Now a committee has been formed under his chairmanship to indigenously develop vendor agnostic, operating system agnostic, interoperable devices & network specifications & standards for transit which shall also work across existing retail network in addition to all transport operator systems regardless of the mode (metro, rail, buses, taxis etc.) and location (all cities across country), for the larger benefit of the entire public of India. In this regard, meetings were held in recent past with committee's vision of digitized- "Flash & Go" system, this workshop being one of those to gather views and inputs from various key stakeholders which constitutes the required ecosystem

for such systems. Shri D S Mishra, Additional Secretary (UD), emphasized on the need for indigenously developing such specifications & standards keeping in line with Govt. of India's Make in India movement, in which maximum devices, technologies etc. should be built within India. He also highlighted the need for developing the hardware like metro gates etc. in India by Indian vendors and requested Prof. Rajat Moona DG CDAC, to involve C-DAC in the development of such hardware.

3. Shri Ashish Kar, Associate Vice President, NPCI presented core objective of NCMC and the level where NPCI proposed to standardize the specification of the system. NPCI presentations included,

a) A brief about NPCI
b) Overview of Payment Industry Landscape
c) Smart Card Architecture
d) Technological level where standardization is being envisaged
e) Common mobility card v/s. Common utility card approach

Participant's views from business, operations & technological aspects were discussed during NPCI presentation. NPCI clarified that proposed Specification/ Standards should be open ended where any service provider can connect seamlessly, to work across country, across operators & across services, backward compatible - to accommodate existing close loop system, and scalable- to add future avenues/ other services etc. NPCI suggested that based on need from end user, flavor of NCMC- Card scheme may be added viz. Low Value Prepaid card, mobile based NFC etc. but the core platform should be single.

4. Technology aspect of system requirement for Common Mobility Card was presented by Prof. Rajat Moona, DG, CDAC. He indicated that unlike existing financial banking card (Debit/Credit), transport system card is attached to value, not the card holders' account. His presentation included technical process flow, highlighting the area where standardization is being sought for & need for interoperability. He indicated that current closed loop systems are either not interoperable or limited interoperable based on business needs of service providers.

5. During the workshop three different key groups were formed for detailed domain specific discussion on NCMC. These three different groups were formed on following lines:

a) Business & Functional Requirement group (Annexure I)- to define business aspect of the system;
b) Technology Solution Requirement group (Annexure II)- to define technical standards of the system; and
c) Operating Guidelines & Legal Requirement group (Annexure III) - to define procedural/ legal aspect of the system,

6. The three independent groups deliberated for approximately 2-3 hours on specified areas, outcome was tabled for further deliberation. Each group presented their findings and recommendations to the committee. Same is attached, along with this MOM, as Annexure I, II & III. One common thing that came out clearly amongst all the three groups was that we must leverage on the existing EMV based payment infrastructure and build the new solution above that so that the card issuance load could be born mostly by Banks thus reducing considerable cost of issuance and duplication of setting up of such issuance infrastructure by various independent transport agencies/ operators. Following are the few key requirements from the three groups, which the proposed specification must support:

5.1.1. **Business & functional requirements group recommended-**

- Process interoperability, scalability and security;
- Open in the sense of supporting multiple issuers, acquirers, vendors and form factors;
- Allow dovetailing transit with prepaid, debit & credit card; and
- Support existing Infrastructure.

5.1.2. **Technical solution build up group recommended that the standards –**

- Must support ISO 14443 standards;
- Must allow for stored value non personalised passes, loyalty cards and tickets; and
- Must allow for entry and exit writing on the card.

5.1.3. **Operating guidelines and legal group suggested that –**

- The information flow from acquiring module to the Bank must be clearly defined along with the relevant protocols and data sizes. There should be sufficient redundancy in the system and clear allocation of responsibility for financial management; and
- For the Low Value Payment cards, the second factor authentication needs to be waived. Also, to comply with Existing KYC norms as per RBI guidelines only prepaid cards should be sold over the counter at transit stations.

Further it was concluded that C-DAC & NPCI will jointly work on preparing a report, on the way forward, based on the workshop and submit it to MoUD, by 5th Jan, 2015. For further refinement & discussion, the report would be tabled within specific group comprising of 5-6 domain experts, as nominated by MoUD, from the workshop participants.

7. Action Item

C-DAC & NPCI to jointly work on preparing a report, on the way forward, based on the workshop and submit it to MoUD, by 5th Jan, 2015.

8. Meeting ended with vote of thanks to all concerned from Shri R K Singh, Director (UT-I), MoUD.

*****

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BUSINESS & FUNCTIONAL REQUIREMENT

Business Requirement Specifications

- Interoperability
- Scalability
- Security
- Open loop – desirable
- Closed loop
- Revenue model for all stakeholders
- Large no. of issuers and acquirers
- Many form factors
- Dovetail transit with prepaid, debit & credit card
- Standards should support existing
- Infrastructure
- Multiple recharge options
- Building an acq. Infrastructure outside transit
- AFC standardization
- Value addition to customer
- Robust fallback system
- Financially self-sustaining
- Initially govt. funding support
- Instant issuance supported
- Network based clearing & settlement
- Grievance redressal system
- Easy adoption by customer

Business Models

- Govt. support for additional investment in acquirer infrastructure and for PTO
- MoUD to drive and provide financial investment support to PTO
- Aligned with Smart City
- Primary income to PTO
- Cards to be procured issued by banks
- Primary income to come from PTO
- Top up infrastructure to be provided by banks

Stakeholders

- Commuters / Cardholders
- Public transport Organisations
- Card issuers
- Txn. Acquirers
- Network Agencies

TECHNOLOGY REQUIREMENT

No.	Mandatory Requirements
1	Contactless- ISO14443
2	Stored value card – Money on card
3	Non-Personalized Passes
4	Non-personalized loyalty
5	Entry and exit writing on card
6	Refund rules
7	Single journey ticket
8	Publishable standard data and protocols- as per the decision of the MoUD
9	Vendor agnostic multi-OS support
10	Testing and certification
11	Dispute settlement

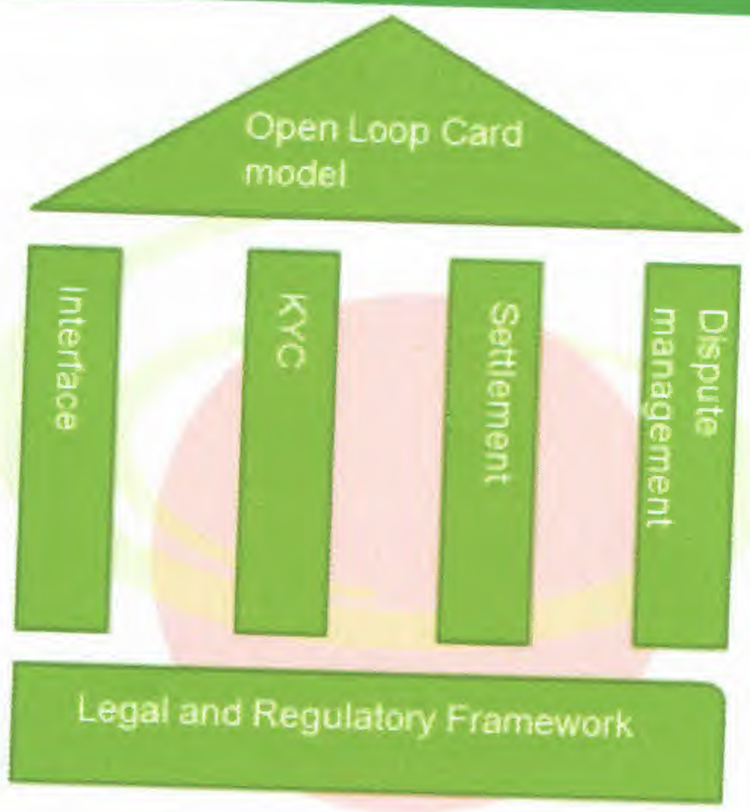
S. No.	Additional requirements specific to payment cards
12	Personalized Passes
13	Account Link
14	Personalized Loyalty
15	Refund
16	Form factors – Token, Card, wearable device, Mobile

Operating Guidelines and Legal Group

Scope and Assumptions

- Open Loop Model
- Card based model (subject to inputs from group 1)
- LVP - Waiver of second factor
- Transit only/Prepaid cards to be issued OTC
- Cards with Debit/credit products along with transit to be issued by bank branches
- The ecosystem needs to cater to multi modal fare integration scenario
- Factors such as performance management, SLAs and related liabilities will be scoped out after finalisation of the business and technical model

Legal and Regulatory Framework



NFS CTS NACH AePS IMPS RuPay

Interface Requirements

The following aspects need to be detailed -

- Information flow from acquiring module to Bank host/s
- Centralised server for each station
- Protocols, data size
- Allocation of responsibility - Financial as well as for data management
- Redundancy

NFS CTS NACH AePS IMPS RuPay

KYC norms

- In order to comply with Existing KYC norms as per RBI guidelines we suggest only prepaid cards be sold OTC at transit stations
- Upgrade to debit/credit card to be provided to customers only through in house banking channels

Settlement

- Existing Rules and frameworks for PoS and ATM transactions to continue for the Debit/credit part
- Guidelines around fare integration to be decided

Dispute management

- Existing Rules and frameworks for PoS and ATM transactions to continue for the Debit/credit part

We recommend that -

- Issuer to develop the minimum thresholds for
  - Settlement of disputes (else it is in favour of the customer)
  - Velocity checks can also be looked upon for recurrent disputes
  - Centralised logs availability for transit transactions
- Issuers to evaluate insurance cover to be provided for the card (to cover risk)
- Chargeback liability shift- impact of relaxation of 2FA on issuer/acquirer to be ascertained

Annex-C

RBI Guidelines for Prepaid Payment Instrument (PPI)

RESERVE BANK OF INDIA

RBI/2015-16/123
DPSS.CO.PD.No.58/02.14.006/2015-16

All Prepaid Payment Instrument issuers, System Providers, System Participants and all other Prospective Prepaid Payment Instrument issuers

Madam / Dear Sir,

Prepaid Payment Instrument (PPI) guidelines – Introduction of New Category of PPI for Mass Transit Systems (PPI-MTS)

A reference is invited to the Master Circular on Policy Guidelines on issuance and Operation of Pre-Paid Payment Instruments in India issued vide RBI/2014-15/105/105 DPSS.CO.PD.PPI No. 3/02.14.006/ 2014-15 dated July 1, 2014 (Updated as on December 03, 2014) outlining the features as well as the requirements for issuance and operations of PPIs.

2. In the process of moving from cash based payments to electronic payments, the migration of micro and small value cash payments can play a significant role in achieving the vision of less-cash society. One such area where a large number of small value cash payments take place relates to mass transit systems. Therefore, based on a review, a new category of semi-closed Prepaid Payment Instruments (PPI) is being introduced with the following features:

i. The semi-closed PPIs will be issued by the mass transit system operator (PPI-MTS) after authorization under 5the Payment and Settlement Systems Act, 2007 to issue and operate such semi-closed PPIs.
ii. The PPI-MTS will necessarily contain the Automated Fare Collection application related to the transit service to qualify as PPI-MTS.

iii. Apart from the mass transit system, such PPI-MTS can be used only at other merchants whose activities are allied to or are carried on within the premises of the transit system.
iv. The PPI-MTS issuer will ensure on-boarding of merchants (only those permissible as under (iii) above) following due procedure applicable to any other PPI issuer.
v. The PPI-MTS will have minimum validity of six months from the date of issue.
vi. The issuer may decide upon the desired level of KYC, if any, for such PPIs.
vii. The PPI-MTS issued may be reloadable in nature and at no point of time the value / balance in PPI can exceed the limit of Rs.2,000/- (Rupees two Thousand Only).
viii. No cash-out or refund will be permitted from these PPIs.
ix. Funds transfer under the Domestic Money Transfer (DMT) guidelines will also not be applicable to these PPIs.
x. All other extant guidelines for escrow arrangement, customer grievance redressal mechanism, agent / merchant due diligence, reporting and MIS requirements etc. applicable to issue of PPIs would continue to be applicable in respect of PPI-MTS.

3. Bases on experience the guidelines will be reviewed taking into account both convenience and security aspects.

4. The above guidelines will come into effect from the date of issue of circular. The other provisions of Master Circular dated July 1, 2015 (as amended from time to time) will remain unchanged.

5. This directive is issued under Section 10(2) read with Section 18 of Payment and Settlement Systems Act 2007 (Act 51 of 2007)

Yours faithfully,
Sd/-
(Nilima Ramteke)
General Manager

Note: taken from RBI web-site.

Annex-D

Comparative Analysis of Three Models

The comparative analysis of three models for NCMC based on key features such as open standards, Interoperability, ease of implementation, support for transit, business case , cost, regulatory frame work, ownership etc. are given as below:

Sr. No.	Key Feature	Close Loop Model	EMV Open Loop – Account based model	EMV Open Loop – Card based (Stored Value) model
1.	Are the standards & specifications necessarily open?	No	Yes	Yes
2.	Do standards exist, or need to be developed?	Do not exist in India. Not required at present	Yes, and supported by all payment card schemes. However, may not be suitable for stipulated transit application. Not required at present.	Yes, EMV standards exist. RuPay has further built stored value functionality on EMV platform.

3.	Ease of Implementation of standards in transit eco system	Easy, as this is the current model in implementation by AFC technology providers	Technically it may be difficult for online validation of commuters every time. Further, offline validation has associated risk to the extent of value specified. Also, there will be challenges in migration for existing operators because of dependence on few vendors.	Understanding & implementing this is relatively easy for the AFC technology providers because it uses the features of present closed loop model. This may be easier for green field projects. However, migration from the existing system could entail technological adoption, which has associated costs.
4.	Any constraint for use in transit	No	Yes. Key business requirement of checking the presence of ticket or pass on card not available in this model.	No
5.	Specifications supported by Independent bodies representing the Industry or Govt.	Not applicable in India	Supported by all the established payment schemes like Master Card/VISA/Rupay	Currently Supported by payment card scheme RuPay but specifications will be available to anyone for implementation.
6.	Technical support to the software developers	Not applicable	Yes	Yes

7.	Possibility of proliferation in other domains	Limited	Yes	Yes
8.	Cost of Infrastructure for PTOs	High, because it is proprietary and captive infrastructure needs to be built by the PTO.	Medium, as card issuance is done by banks using their existing infrastructure.	Lower than the other two due to the possibility of wider adoption and indigenous open standards.
9.	Maintenance Cost for PTOs	High, because it is proprietary.	Medium.	Lower than the other two due to the possibility of wider adoption and indigenous open standards.
10.	Operational Cost for PTOs	High, because of dedicated resources.	Medium, since part of the activity is taken care of by the banks.	Low, because complete operations are managed by bank or by local vendors, which are enabled to support these standards. Further the cost of authentication significantly goes down.
11.	Cost to the Commuter	One time issuance cost as prescribed by the PTO.	One time issuance cost as prescribed by the Bank. It could be recurring annual cost as in credit / Debit card. For the commuter, it is only marginal additional	One time issuance cost as prescribed by the Bank. It could be recurring annual cost as in credit / Debit card. For the commuter, it is only marginal additional

			cost for transit since he is already using it for other purposes.	cost for transit since he is already using it for other purposes.
12.	Value proposition to Commuter	Low, as it is restricted to specific PTO ecosystem. For other usage like different PTO/ retailers/ e-commerce, commuter will require different transit/ debit/ credit card.	High, as user can use the same card not only across PTOs but also outside the transit eco system.	Marginally Higher because the commuter can not only use the same card across PTOs, and outside the transit eco system but also has the advantage of stored value.
13.	Certification Process	No standard process defined because it is for restricted use.	A well-defined functional and security certification process is in place.	A well-defined functional and security certification process is in place.
14.	Card Type	Proprietary & vendor locked.	Vendor agnostic	Vendor agnostic
15.	Benefit in Indian Context	Low, as all solutions are controlled by international players.	Low, as all solutions are controlled by international players.	High, as standards are built and managed within the country. This is in line with national initiatives of Make in India/ Design in India.
16.	Dispute management	Proprietary Process.	Well defined & established process followed by Banks.	Well defined & established process followed by Banks.
17.	Interoperability	Limited.	Easily available.	Easily available.

18.	Ownership of Card management service	Public transport organizations (PTO)	Financial institutions (FI) or Banks.	Financial institutions (FI) or Banks or PTOs.
19.	Ownership of Clearing and settlement service management	Proprietary.	Leveraging on the existing infrastructure.	Leveraging on the existing infrastructure.
20.	Ownership of Key Management service	Public transport organizations (PTO).	Banks/ FIs.	Issuing bank and card scheme. However, PTO may have their own key management service.
21.	Risk to the commuters	Marginally higher than number two. However, the risk exposure is minimized to the extent of stored value.	Medium.	Marginally higher than number two. However, the risk exposure is minimized to the extent of stored value.
22.	Transaction time at metro gates	Low because of Local authentication and one way authentication (only readers at the gates authenticate the cards)	High because of non-local authentication.	Low because of local authentication but slightly higher as readers and cards authenticate each other (two-way authentication) to ensure non-proprietary interoperable solution.

Annex-E

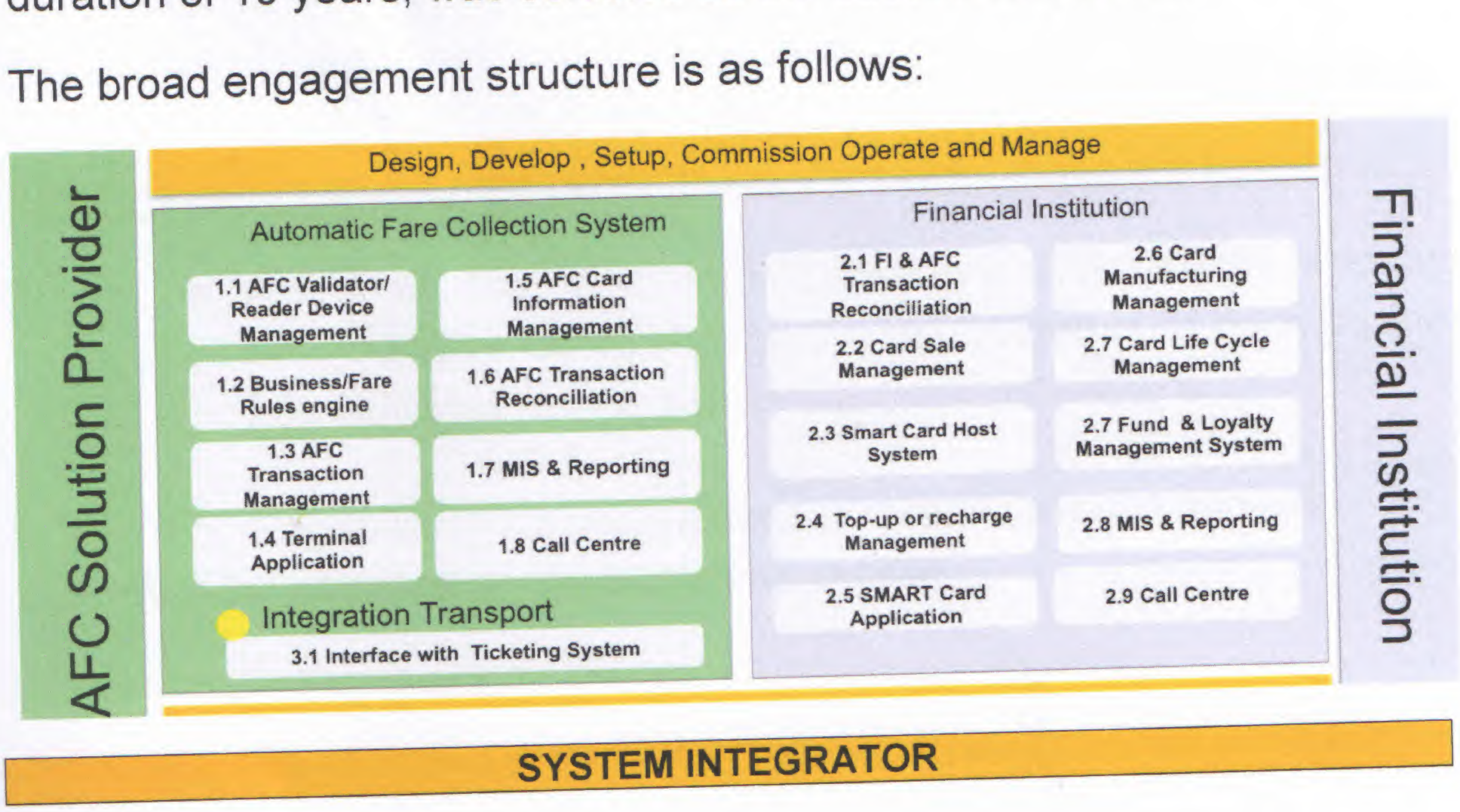
Adoption of Open Loop Model by Kochi Metro Rail Ltd (KMRL)

KMRL adopted an open an open-loop model in transit so that the card users may be able to meet all their payment needs, including transportation, retail shopping and e-commerce across different platforms. The company aimed to develop a business model so as to generate additional revenue to make it economically sustainable.

Business Model

KMRL engaged a consortium with a Financial Institution as the lead member, an AFC solution provider as a compulsory partner and a system integrator as an optional partner, through an open competitive bidding process. The technically qualified bidder, who quoted the highest Net Present Value of the total royalty payable to KMRL during contract duration of 10 years, was selected as the successful bidder.

The broad engagement structure is as follows:



Roles and Responsibilities of Partners

1. **Financial Institution (Axis Bank)**
   a. Set up the EMV smart card based integrated transport ticketing system;

b. Issue Credit, Debit & Pre-paid EMV standard open loop travel card/ stored value contactless cards and Quick Response (QR) coded tickets for single journey to customers;

c. Provide payment gateway services for transactions (ticket purchase/ top-up) through websites, bank auto top-up, top-up through bank account & mobile app etc.;

d. Integration of other transit and non-transit services with payment gateway, provide e-wallet and mobile application; and

e. Run customer support and card logistics operations.

2. AFC Supplier (Asis Electronik)

a. Supply and installation of fare gates;

b. Design and supply of software for the fare gates;

c. Provide defect liability support for 6 years; and

d. Provide maintenance support for the entire contract duration.

3. System Integrators (AGS Transact Technologies Limited)

a. Acting as the coordinator between KMRL, the FI and the AFC supplier for translating the requirements of each partner into deliverables, as per contract conditions; and

b. Supervising the installations and maintenance services.

Commercial aspects of the business model

The salient features are as below:

- The FI would invest the entire capital expenditure for providing the hardware and software for fare collection of Kochi Metro phase 1 and the proposed extension of 13 KM in future;
- KMRL would provide an annual fee of 4% of the fare box collections to the FI;

- The FI would share 0.2% of the gross revenue on non-fare box transactions with KMRL;
- FI shall pay an annual royalty (totaling Rs. 208.9 crore) over a period of 10 years to KMRL as per the contract conditions;
- Expenditure on comprehensive maintenance of the AFC system, will be borne by the FI for 10 years;
- Defects liability period is 6 years; and
- The contract period is 10 years from the date of commencement of revenue operation of the last reach.

Possible motivation of the key stakeholders

This model has been tried for the first time in the country and has given a new dimension to fare collection by the PTOs associating various other stakeholders. Possibly different players have their own wins. This could be analysed in several ways. One perspective could be as below:

1. **The Financial Institution**
   a. Huge potential to increase the card penetration through KMRL commuter base;
   b. First mover advantage;
   c. Exclusivity in Kochi Metro. Other banks can only come through the FI; and
   d. Acquiring new technology, knowhow and skill with possibility of proliferation in different territories.

2. **The AFC Supplier**
   a. Business as usual; and
   b. Long term business commitment.

3. **System Integrator**
   a. New Business opportunity.

4. **Customers**
   a. Promotions/ discounts and loyalty rewards by consortium for increased customer acquisition;

b. Convenience of smart cards – Transit Card as "top-of-wallet' choice to card-savvy customers;

c. Ease in implementing common mobility solution through the inter-operable open standards;

d. Option to link any bank account to the card/wallet; and

e. The city mobility app – Enabling seamless travel.

5. KMRL

a. Additional revenue from-

i. Share from non-KMRL transactions; and

ii. Premium from consortium.

b. No investment in capex for the fare collection system; and

c. No operational hassles during contract duration.

Other aspects

- Card Issuance charges, top up and transaction fee are to be charged by the FI as per RBI guidelines;
- The fee chargeable to the card-holder commuters may be converted into free travel miles by KMRL for them; and
- Card and terminal specifications and clearing house functionality will be provided by NPCI.